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PATENT SPECIFICATION

DRAWINGS ATTACHED

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1,085,069

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Index at acceptance: —**H2** B(1F1C, 1F7, 2A5A2, 2C10, 2C11, 2E, 4G); **H2** E(3A6G, 3A7, 3A10B2, 3A10B3, 3A11B, 3A12, 3C2C, 3C2D, 3C2E, 3C6C, 3C6D2, 3D2, 3D3, 10B, 24, 31); **H2** G(2A1A, 4B, 4G)

Int. Cl.: —**H 01 h 23/10**//H 01 r

COMPLETE SPECIFICATION

Switch-Fuse Unit for Electrical Panelboard

We, SQUARE D COMPANY, Executive Plaza, Park Ridge, Illinois, United States of America, A Corporation organised and existing under the laws of the State of Michigan, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates generally to switch-fuse units and more particularly to a switch-fuse unit for use in an electrical panelboard.

An object of the invention is to provide a switch-fuse unit having a casing, a pair of separable contacts, an operating handle operable selectively to effect engagement and separation of the contacts respectively with and from each other, and a fuse holder removably insertable in the casing axially of a cartridge fuse held thereby.

The present invention is a switch-fuse unit comprising an elongated casing, a line terminal adjacent one end of said casing, a stationary contact in said casing electrically connected to said line terminal, a movable contact arm in said casing, a movable contact on said movable contact arm engageable with said stationary contact, a pivotally mounted operating handle extending outwardly of said casing and operatively connected to said movable contact arm to effect engagement of said movable contact with said stationary contact in an ON position of said handle and to effect disengagement of said movable contact from said stationary contact in an OFF position of said handle, a fuse clip secured in said casing and electrically connected to said movable contact arm and adapted to receive one ferrule of a cartridge fuse, a load terminal adjacent the other end of said casing, a terminal strap in said casing electrically connected at an outer end portion to said load terminal, a stationary fuse contact portion adjacent an inner end portion of said terminal strap, a fuse holder removably insertable into said casing axially of the cartridge fuse when the cartridge fuse is mounted in said fuse holder, said fuse holder including a combination fuse clip and movable contact blade member, a fuse clip portion of which is adapted to receive the other ferrule of the cartridge fuse and a movable contact blade portion of which engages said stationary fuse contact portion of said terminal strap when said fuse holder is disposed in an operative position in said casing.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which: —

Fig. 1 is a side view of a switch-fuse unit constructed in accordance with the invention, the operating handle therefor being in ON position;

Fig. 2 is an end view of the switch of Fig. 1;

Fig. 3 is a top view of the switch of Fig. 1;

Fig. 4 is an enlarged sectional view of the switch of Fig. 1 taken generally along the line 4—4 of Fig. 7;

Fig. 5 is a perspective view of the fuse holder of the switch of Fig. 1;

Fig. 6 is a sectional view taken generally along the line 6—6 of Fig. 5;

Fig. 7 is an enlarged view similar to Fig. 1 but with the cover of the switch removed, the operating handle shifted to OFF position, and portions of the fuse holder shown in section;

Fig. 8 is a fragmentary view similar to

Fig. 7, but with the operating handle shown in section and shifted to ON position;

Fig. 9 is a perspective view of the spring anchoring member of the switch of Fig. 1;

Fig. 10 is a perspective view of the moveable contact arm of the switch of Fig. 1;

Fig. 11 is an enlarged sectional view taken generally along the line of 11—11 of Fig. 7; and

Fig. 12 is a sectional view taken generally along the line 12—12 of Fig. 7.

With reference to the drawings, a switch-fuse unit 12 constructed in accordance with the invention includes a casing 13 molded of insulating material and having a base portion 14 and a cover portion 16 provided with appropriate recesses and projections for receiving and entrapping the various working parts of the switch, and secured together as by a plurality of rivets 18.

The switch 12 is provided adjacent one end of the casing 13 with a line terminal 20 which is shown as a terminal of the bolt-on type having a screw 22 for securing the terminal 20 to a bus bar (not shown) of an electrical panelboard. An inner end portion of the terminal 20 is provided with a stationary contact 24, as best shown in Fig. 7. A resilient mounting clip 26 is provided adjacent the other end of the casing 13.

An operating handle 28 molded of insulating material is mounted for pivotal movement to ON and OFF positions in the casing 13 by means of a pair of trunnions 29 formed integrally with the handle and received in circular recesses respectively in the base portion 14 and cover portion 16, as best shown in Fig. 4. Suitable ON and OFF indicia are provided on the base portion 14 for indicating the ON and OFF positions of the handle 28, as shown in Fig. 3.

A generally channel-shaped, elongated moveable contact arm 30 is arranged to pivot oppositely to the direction of selective pivotal movement of the operating handle 28, which is provided with a pair of spaced, depending leg portions 31 disposed generally inwardly of the trunnions 29. The contact arm 30, best shown in Fig. 10, is provided with a moveable contact 32 secured to a bottom portion of the channel adjacent an inner end of the contact arm and engageable with the stationary contact 24 in the ON position of the handle as shown in Fig. 8. The side portions of the channel-shaped contact arm 30 are elongated adjacent an outer end of the contact arm to provide a pair of spaced-apart leg portions 34 having rounded outer end portions pivotally received respectively in a pair of recesses 36 provided respectively in the depending leg portions 31 formed integrally with the handle 28. An arc shield 38 formed of electrically insulating material is hooked adjacent one end in a slot 30*a* (Fig. 10) in the contact arm 30, the other end portion of the arc shield 38 being slidably received in a recess 39 in the casing 13.

The contact arm 30 moves with a snap action provided by a tension spring 40 hooked at one end in a slot 30*b* (Fig. 10) in the bottom portion of the channel-shaped contact arm and at the other end to an arm 42 of a spring anchoring member 43 secured in the base portion 14 and best shown in Fig. 9. The arm 42 is disposed between the leg portions 31 of the handle 28, as shown in Fig. 4. The member 43 is also provided with a pair of oppositely sidewise extending projections 44 and 45 (Fig. 9). The projection 44 serves as an abutment for a striking portion 46 provided on one of the leg portions 34 of the contact arm 30. In case the contacts 24 and 32 become welded together temporarily, the striking portion 46 strikes the projection 44 to aid in breaking the contacts apart when the handle 28 is moved from ON to OFF position. The member 43 is held in place by the projection 45, which is received in a recess in the base portion 14.

Secured within the base portion 14 is a generally U-shaped fuse clip 48 the bight portion of which is circular and the leg portions of which are formed to partially define a hollow circular cylinder open at one end to receive an end ferrule of a cartridge fuse 50 axially of the fuse. One leg portion of the fuse clip 48 is provided with an extension 52 which aids in the securing of the fuse clip 48 in the base portion 14 and is electrically connected to the contact arm 30 through a flexible cable 54 having one end portion brazed or otherwise secured to the extension 52 and the other end portion brazed to the contact arm 30 and also held by a bent-over tongue portion 55 (Fig. 10).

A combination load terminal and stationary contact member 56 is provided adjacent the opposite end of the casing 13 from the line terminal 20 and above the mounting clip 26. The member 56 includes a terminal body portion 56*a* formed integrally with a terminal strap portion 56*b* and a stationary contact portion 56*c*. A cable clamping screw 58 is threadedly mounted in the terminal body portion 56*a*.

A fuse holder 60 best shown in Fig. 5 is removably insertable in the casing 13 axially of the cartridge fuse 50 held thereby. The fuse holder 60 includes a body 62 formed of insulating material integrally with a handle 62a, and a combination fuse clip and moveable contact blade member 64 including a fuse clip portion 64*a* and a moveable contact blade portion 64*b*. The fuse clip portion 64*a* in which the fuse 50 is held is received in a recess in the inner end of the body 62 and the contact blade portion 64*b* extends outwardly therefrom for engagement with the stationary contact portion 56c of

the member 56. As best shown in Figs. 7 and 8, the moveable contact blade member 64 includes a projection 64*c* having a resilient anchoring tongue 64*d* sheared outwardly therefrom for locking the moveable contact blade member 64 in place in the body 62.

Interlock means are provided for preventing insertion and removal of the fuse holder 60 when the switch is in ON position. Thus, the body 62 is provided with a recess 62*b* for receiving an end portion 66*a* of a shiftable interlock member 66 as shown in Figs. 4 and 8 when the handle 28 is shifted to ON position. The member 66 is retained in the base portion 14 and biased against the handle 28 by a compression spring 68. An end portion 66*b* of the member 66 opposite the end portion 66*a* is received in a groove 28*a* (Fig. 4) in the handle 28. The end portion 66*b* is rounded and the groove 28*a* is partially defined by a cam surface 28*b*, (Figs. 7 and 8) which drives the end portion 66*a* into the recess 62*b* when the handle 28 is shifted to ON position. The recess 62*b* is partially defined by a surface 62*c* which is engageable with the end portion 66*a* to prevent removal of the fuse holder 60 from the casing 13 when the switch is in ON position. Insertion of the fuse holder 60 into the case 13 sufficiently for the moveable contact blade portion 64*b* to engage the stationary contact portion 56*c* is prevented when the handle 28 is in ON position by engagement of the inner end of the body 62 of the fuse holder with the end portion 66*a*.

An indicating lamp 70 is provided in the base portion 14 and is visible through an aperture 71 provided therein. When the switch is energized and the handle 28 is in ON position, the lamp 70 glows if the fuse 50 either is blow, or is not present in the casing. The lamp is provided with a pair of lead wires 72*a* and 73 electrically connected respectively to the fuse clip 48 and the terminal strap portion 56*b*, *i.e.*, in parallel to the fuse 50. A spring clip 75 is provided to hold the wire 73 in electrical engagement with the terminal strap portion 56*b*, as best shown in Fig. 11. The wire 72*a* is connected to a resistor 76 which in turn is connected to a wire 72*b*. The wire 72*b* is received in aperture 48*b* (Fig. 12) in a tongue portion 48*a* sheared and bent out from the fuse clip 48. A helical compression spring 78 disposed in the base portion 14 surrounds the tongue portion 48*a* and presses the wire 72*b* into electrical engagement with the fuse clip 48.

It will be seen that an improved switch-fuse unit for use in an electrical panelboard has been provided in which a fuse holder is removably insertable in the switch casing axially of a cartridge fuse held thereby and an operating handle for the switch also operates an interlock mechanism for the fuse holder to prevent removal of the fuse holder when the switch handle is in ON position.

It will also be seen that a fuse clip for a switch-fuse unit has been provided, the fuse clip being formed in one piece and receiving a ferrule of a cartridge fuse axially of the fuse and engaging the ferrule on diametrically opposite side portions thereof. Further, improved means of electrically connecting the lead wires of an indicating lamp respectively to a fuse clip and a terminal strap of a switch-fuse unit has been provided.

WHAT WE CLAIM IS:—

1. A switch-fuse unit comprising an elongated casing, a line terminal adjacent one end of said casing, a stationary contact in said casing electrically connected to said line terminal, a movable contact arm in said casing, a movable contact on said movable contact arm engageable with said stationary contact, a pivotally mounted operating handle extending outwardly of said casing and operatively connected to said movable contact arm to effect engagement of said movable contact with said stationary contact in an ON position of said handle and to effect disengagement of said movable contact from said stationary contact in an OFF position of said handle, a fuse clip secured in said casing and electrically connected to said movable contact arm and adapted to receive one ferrule of a cartridge fuse, a load terminal adjacent the other end of said casing, a terminal strap in said casing electrically connected at an outer end portion to said load terminal, a stationary fuse contact portion adjacent an inner end portion of said terminal strap, a fuse holder removably insertable into said casing axially of the cartridge fuse when the cartridge fuse is mounted in said fuse holder, said fuse holder including a combination fuse clip and movable contact blade member, a fuse clip portion of which is adapted to receive the other ferrule of the cartridge fuse and a movable contact blade portion of which engages said stationary fuse contact portion of said terminal strap when said fuse holder is disposed in an operative position in said casing.

2. A switch-fuse unit as claimed in claim 1, including interlock means operable by said handle and effective when said handle is in said ON position to prevent removal of said fuse holder from said casing and to prevent insertion of said fuse holder into said casing sufficiently for said movable contact blade portion to engage said stationary contact portion of said terminal strap.

3. A switch-fuse unit as claimed in claim 2, in which said interlock means includes an interlock member reciprocally mounted in said casing and operatively connected to said handle.

4. A switch-fuse unit as claimed in any preceding claim, wherein said contact arm has a pair of opposite end portions, the movable contact being secured to one end portion of said contact arm and engageable with said stationary contact, mounting means in said casing on which the other end portion of said contact arm is mounted to accommodate rotational movement of said contact arm, said outer portion of the operating handle being alternatively movable in opposite directions respectively to ON and OFF positions relatively to said casing, a tension spring in said casing having one end portion connected to said contact arm between the opposite end portions thereof, said tension spring biasing said contact arm toward said operating handle, means operatively connecting said operating handle, tension spring, and contact arm in a manner such that movement of said outer portion respectively to said ON and OFF positions moves a line of action of said tension spring relatively to said mounting means to dispose said line of action respectively on opposite sides of said mounting means and effect movement of said movable contact respectively into and out of engagement with said stationary contact, said fuse holder being separate from said operating handle and removably mounted in a different portion of said casing from that in which said operating handle is mounted, and means connecting a fuse electrically in series with said contacts when said fuse holder is mounted in said casing with a fuse mounted in the fuse holder.

5. A switch-fuse unit as claimed in any preceding claim, including a blown fuse indicating lamp in said casing having a pair of lead wires electrically connected respectively to said terminal strap and to said fuse clip secured in said casing.

6. A switch-fuse unit as claimed in claim 5, including a spring clip securing one of the lead wires of said lamp to said terminal strap.

7. A switch-fuse unit as claimed in claim 4 or claim 5, wherein said fuse clip secured in said casing includes a portion having a tongue sheared and bent out therefrom and apertured to receive a wire electrically connected to said lamp, and a helical compression spring is provided in said casing in surrounding relationship to said tongue to press said wire against said fuse clip portion.

8. A switch-fuse unit substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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5, Park Gardens, Glasgow, C.3.
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3, Gray's Inn Square, London, W.C.1.

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Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained

Fig. 1.

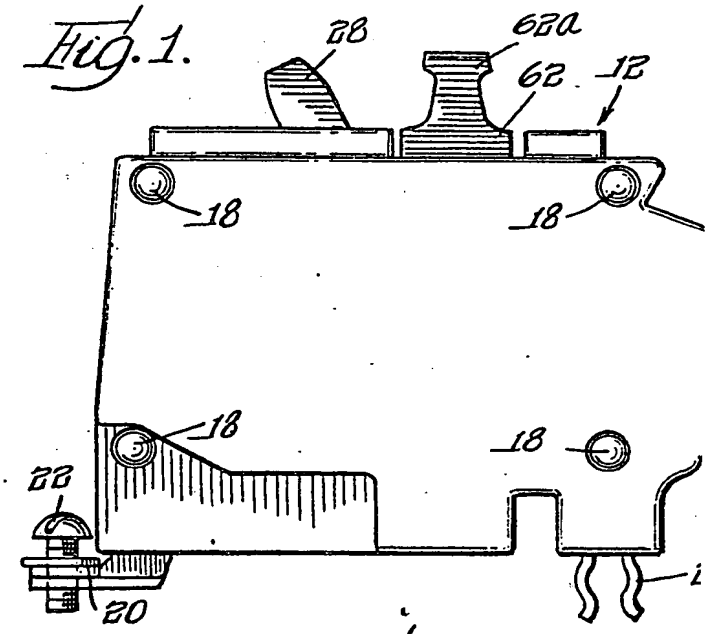


Fig. 3

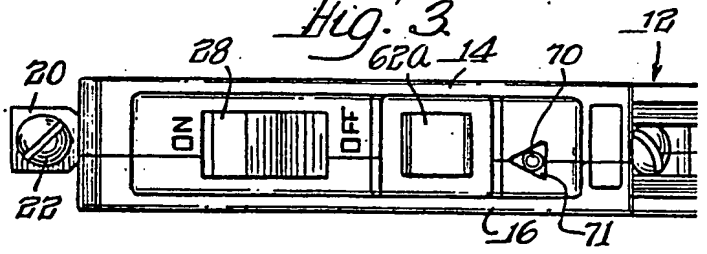
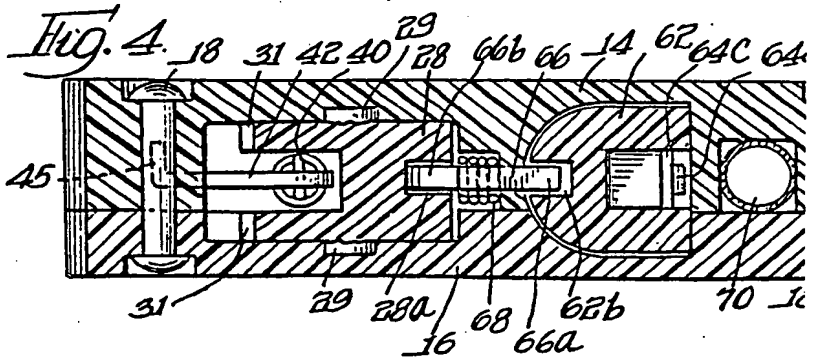


Fig. 4.



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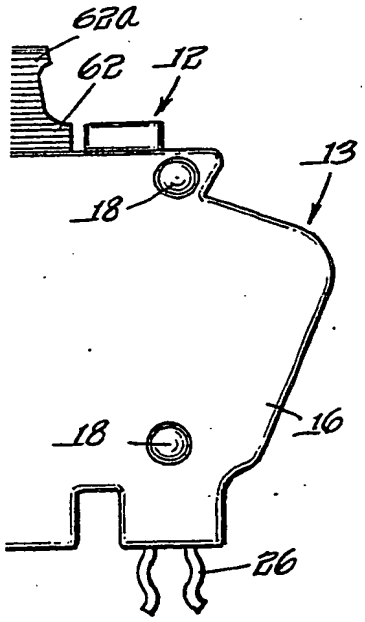
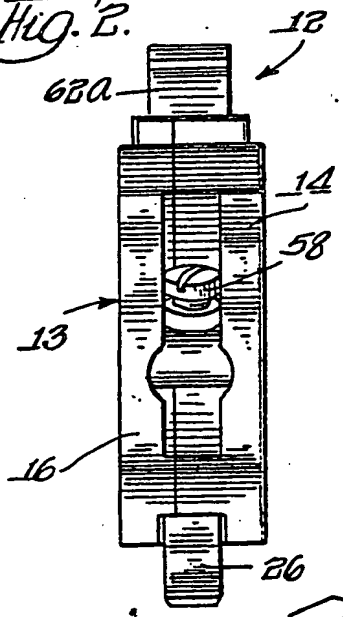
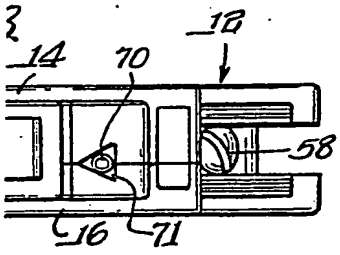


Fig. 2.





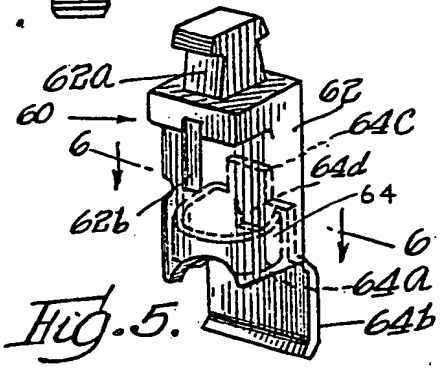


Fig. 5.

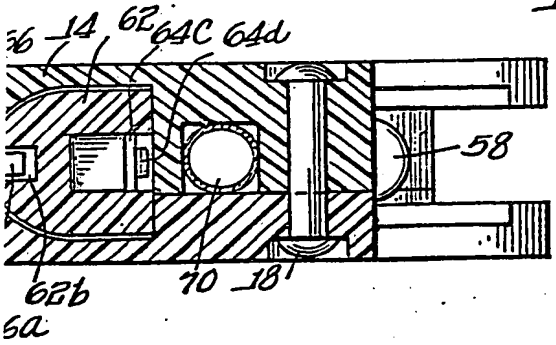
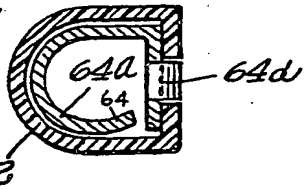


Fig. 6



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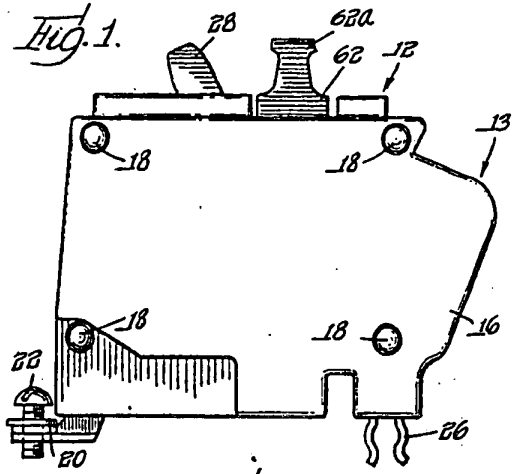


Fig. 2.

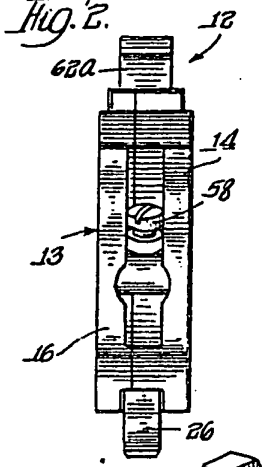
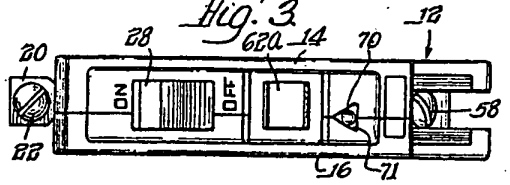


Fig. 3.



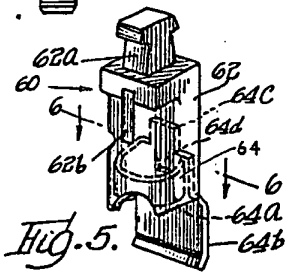
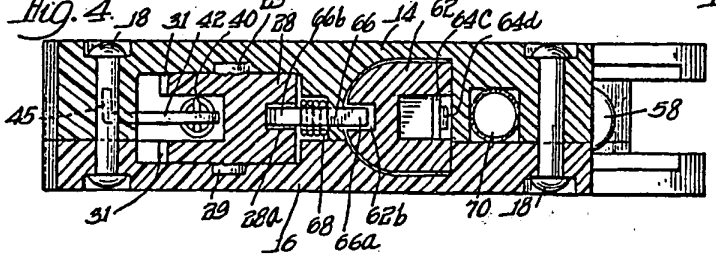


Fig. 5.

Fig. 4.



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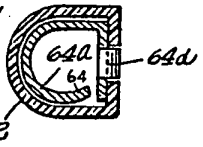

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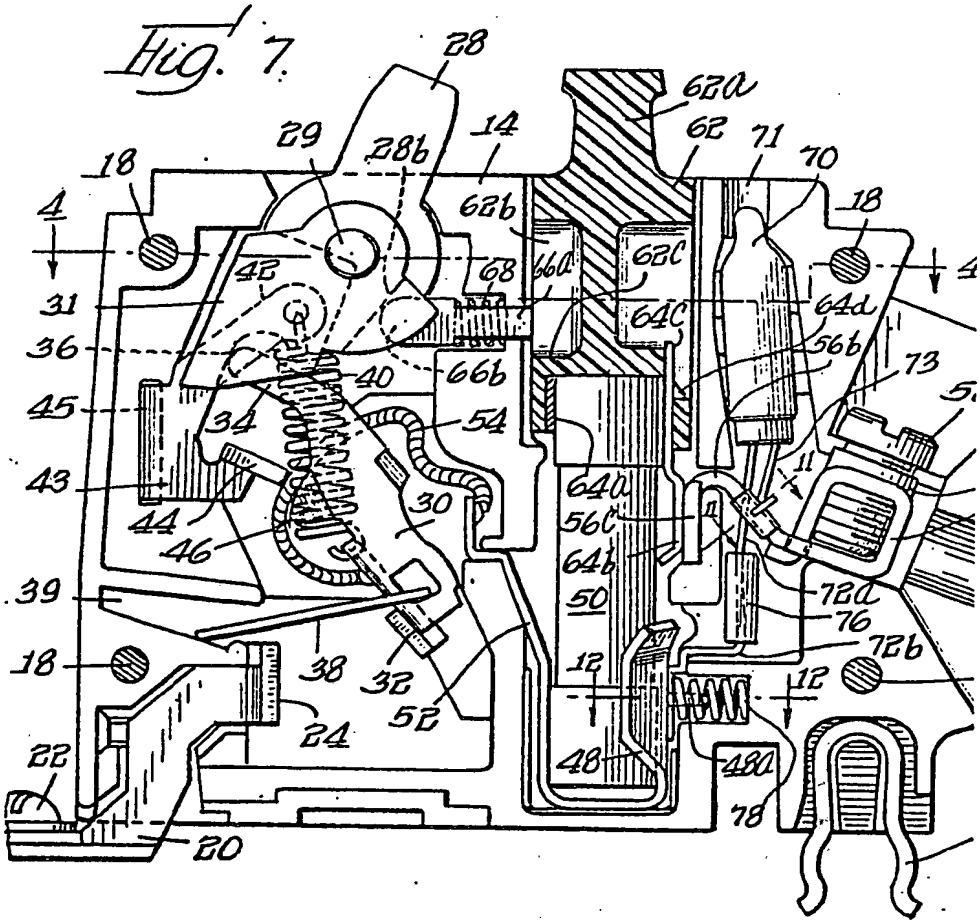

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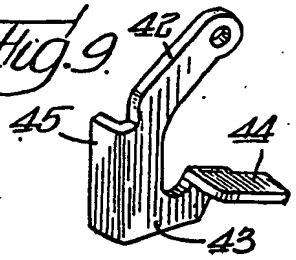

Fig. 10.

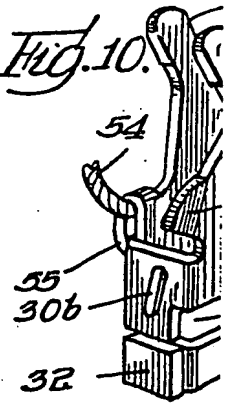

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Fig. 7.

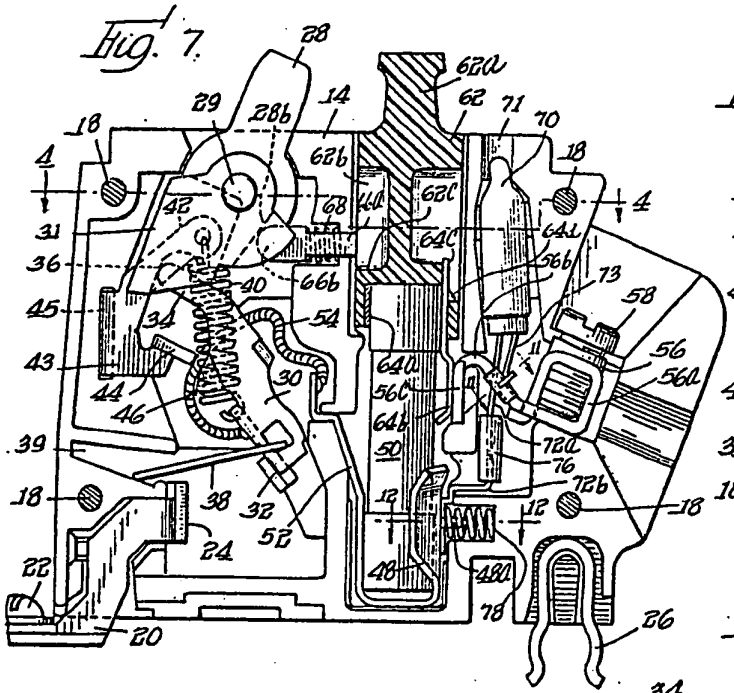


Fig. 8.

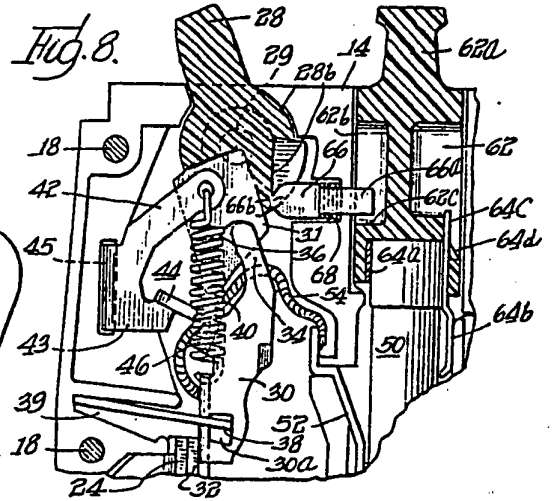
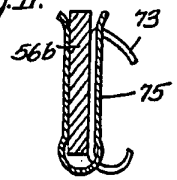


Fig. 11.



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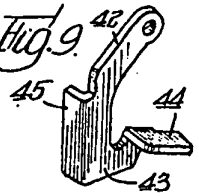
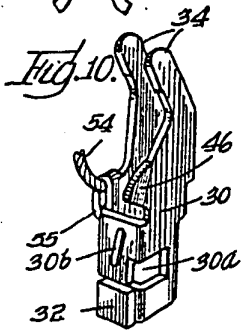


Fig. 10.



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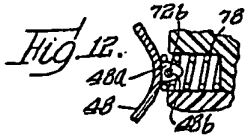

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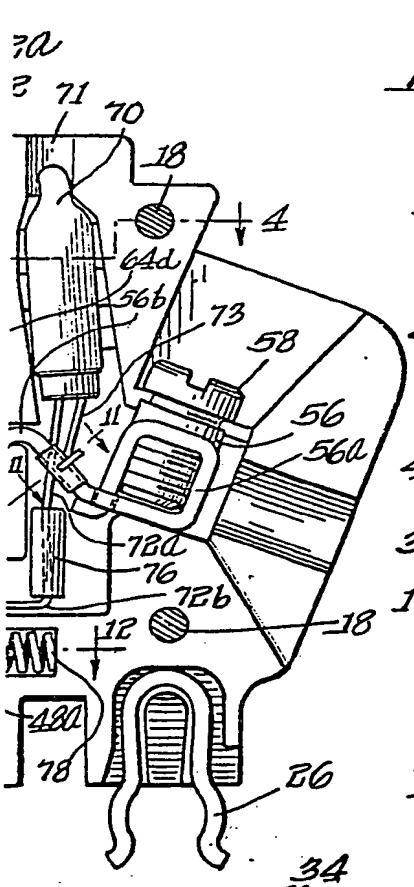

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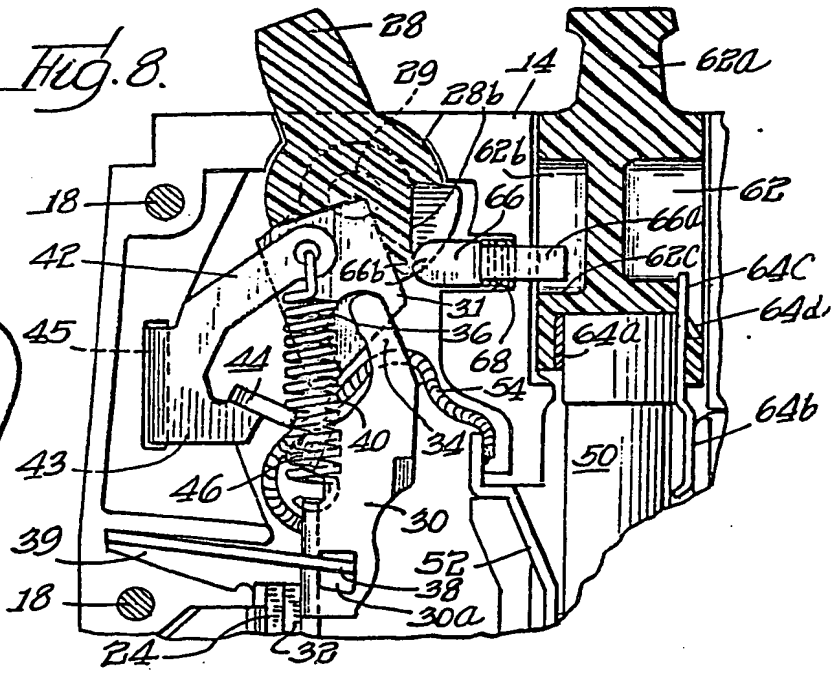
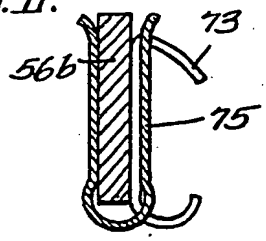


Fig. 11.



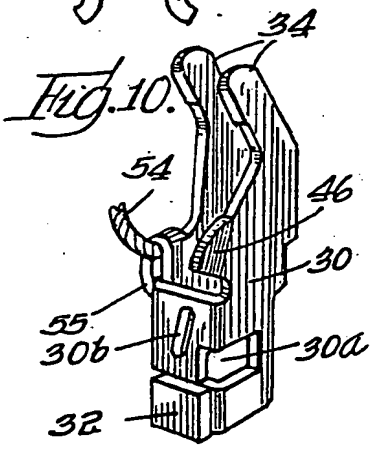


Fig. 10.

Fig. 12.